Commodore News

OFFICIAL   PET   USERS'   CLUB   NEWSLETTER

ISSUE   No.   Ø4

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We like to publish interesting features from PET Users about their applications and set-ups. If you would like to contribute to the next newsletter, please send your article, letter or comments to:

> The Editor,
> PET Users' Club,
> Commodore Systems,
> 360 Euston Road,
> London NW1 3BL

Please note: To provide a good information service to PET Users, we regularly mention equipment, software and services offered by companies and individuals not directly linked to Commodore. In doing so, we are not making recommendations and cannot be held responsible for the validity of any statements made.

Included with this newsletter, you should have received a copy of the booklet, "PET COMMUNICATION WITH THE OUTSIDE WORLD". This is a free gift (call it an early Christmas present) from Commodore to all PET Users' Club members. It contains a very thorough description of the PET's interfaces, with details of the individual input/output lines, the internal sequence of events and the BASIC commands used. The booklet will prove to be extremely useful to anyone intending to link their PET to another piece of equipment.

Additional copies may be obtained from Commodore for £1.00 plus a stamped addressed envelope.

OVERSEAS SUBSCRIPTIONS

Since we are increasingly getting requests for subscriptions to the PET Users' Club from overseas, we have now decided that this facility will be available, operating in the same way as inside the UK, but for £15.00 per annum. It should be remembered, however, that we do not accept, in this country, orders for equipment or software from overseas.

PET SALES

Over 2,000 PETs have now been delivered in this country alone. Inevitably we are now beginning to reap the benefits of such a wide base of applications and software (see Users' Directory, etc.).

SPECIAL OFFERS

With Christmas only six weeks away, most PET Users (if they aren't too busy programming their PETs) will be looking round for good ideas for Christmas presents. As a special offer to PET Users' Club members only, we are making available some other Commodore products at very reasonable prices:

LIQUID CRYSTAL WATCHES

These are 5-function watches, with hours, minutes, seconds, date and month. They both have a backlight for night use and a clear LCD display. The ladies' version (model 35X1) is finished in chrome while the men's watch (also in chrome) comes complete with a matching chrome bracelet. Both are priced at £8.50 including VAT and P & P.
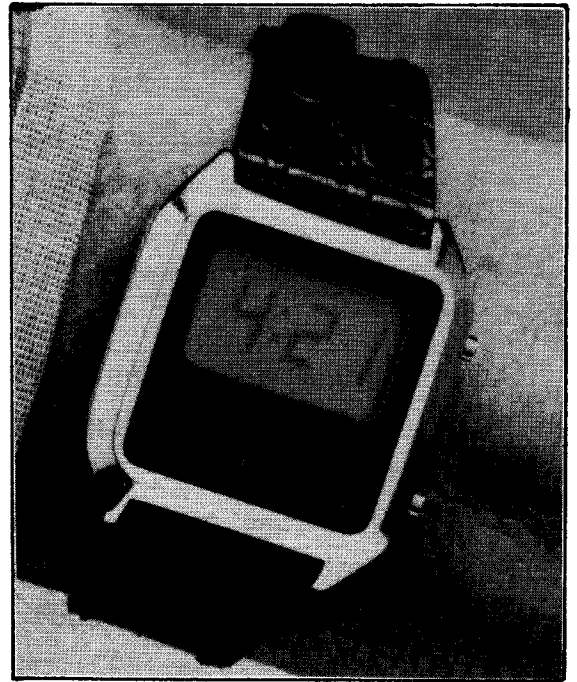
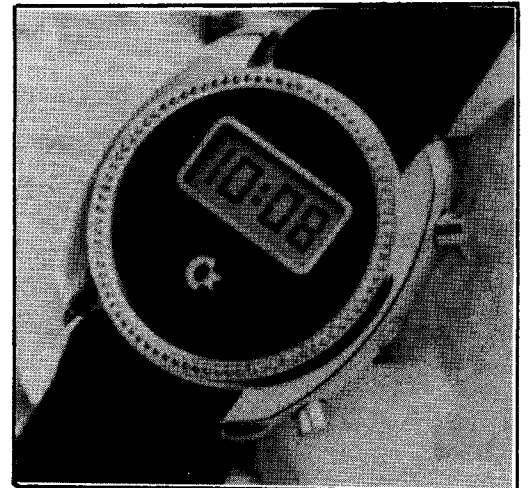**95x3**

LED CALCULATORS

Model 797

A 4-function calculator with a full 4-key memory, % and exchange keys. Users' Club Price £3.95 including VAT and P & P

Model 7919

This very popluar basic scientific calculator has trigs, logs, powers and roots and 1 memory. The display is 8-digit, with a 5 + 2 exponent mode. Users' Club Price £5.95 including VAT and P & P

35x1

Offers are subject to availability so take advantage of these prices while you can. Delivery is approximately 21 days from receipt of cheque. This offer is available only to PET Users' Club members by the use of the order form below.

To: Commodore Business Machines
           Industrial Estate
           Eaglescliffe
           Stockton-on-Tees
           County Cleveland   Tel. 0642 780014

Please send me the following items at the PET USERS' CLUB
special offer price:

......   35X1 Ladies LCD Watch @ £8.50 each   ....
......   95X3 Mens LCD Watch   @ £8.50 each   ....
......   797 LED Calculator   @ £3.95 each   ....
......   7919 LED Scientific Calc. @ £5.95 each ....

(All prices include VAT and P & P)   TOTAL   _____

I enclose a cheque made payable to:
Commodore Business Machines (UK) Limited
for the amount of £.............

NAME: ....   PLEASE
Address: ....   USE
           ....   BLOCK
           ....   CAPITALS

Software

In this section we shall be dealing with the software available from Commodore for the PET. Our Master Library contains professionally written, well documented programs which have been tried and tested prior to release. The Common Library consists of programs written by PET Users for sale at very low cost.

We shall also be reviewing the latest programs in some detail and be making some general comments about obtaining software for your PET.

COMMON LIBRARY

Below is a list of all the programs currently available from the Common Library. If you would like to submit a program that you have written please note the following:

1. Programs submitted should be on cassette - we regret that we cannot return them, so please keep a copy.
2. All programs should be "Self-documenting" as we do not supply booklets with these programs.
3. Submissions should be sent to the Software Manager at Commodore. Please include your name and address.
4. For every accepted program we will send out four free Common Library programs of your choice.

The list is as follows:

PROGRAM NUMBER	NAME	AUTHOR	DESCRIPTION
CL0001	ESP TEST	Mr. Chambers	Tests ability to 'perceive' random numbers
CL0002	SLOT MACHINE	"	
CL0003	MASTERMIND	Mr. McDonald	
CL0004	MOO	Prof. A. Colin	Guess numbers against computer
CL0005	LIFE	Mr. Wheatcroft	
CL0006	STARWARS	Dr. Lucas	Based on a raid on 'Death Star'
CL0007	ONE ARM BANDIT	A. M. Robertson	Good graphics
CL0008	DEEPSPACER	D. A. Allen	Space game
CL0009	SOLVING SIMULTANEOUS EQUATIONS	Prof. A. Colin	Up to 16 variables
CL010	MEMORY DISPLAY IN HEX	Mr. Tribe	

All the following are new this issue:

PROGRAM NUMBER	NAME	AUTHOR	DESCRIPTION
CL011	CAR MAZE	Unknown	Allows you to drive a vehicle through a random maze
CL012	BOXES	Unknown	A version of the children's game "squares". You play against the computer
CL013	GOLF	M. J. Lake	Reasonable graphics. You choose your handicap, confess your weaknesses
CL014	CONCENTRATION	F. T. Chambers	Computer implementation of Pelmanism type card game
CL015	21 CARD TRICK	L. M. Gold	Computer implementation of traditional party game
CL016	PATIENCE	X. Houching	Known in US as Solitaire
CL017	SOLITAIRE	J. R. Park	Traditional European board game
CL018	DARTS	E. Bloomfield	Workmanlike simulation of famous game
CL019	CRAPS	Prof. A. Collin	The Dice Game
CL020	TANK	C. Tuppen	Original tank battle game

CL∅21	U BOAT	D. Langford	A nice graphic. You sink ships
CL∅22	BOMB DROP	B. P. O'Hare	Aim your bomb to hit a target
CL∅23	ROBOT CHASE	O. F. Bulmer	Defend yourself with mine-fields as robots close in to wipe you out.
CL∅24	K-SCOPE	B. P. O'Hare	Produces kaleidoscope patterns
CL∅25	WIDGETS	Dr. R. Botting	Factory economics simulation
CL∅26	SPECULATION	C. Ryan	Stock market simulation
CL∅27	LIFE (machine code)	M. Taylor	Conway's Life game (taken from Micro Journal. Screen crackle suppressed)
CL∅28	TIMES TABLE	W. Lyons	Teach your children the rudiments
CL∅29	BASE CONVERSION	R. C. Gentry	Converts a number of any base to a number of any other base
CL∅3∅	NON-PARAMETRIC STATISTICS	P. Harper	Mann-Whitney & Spearman tests
CL∅31	DISPLAY F(X)	C Tuppen	High resolution graphic plotter
CL∅32	3D PLOT	A. Picken & C. Bullock	Attempts to display functions of two variables

To order Common Library programs, please quote <u>Program Number</u> and <u>Name</u>.

Minimum Order - 4 programs - £5.00

Each additional program - £1.25

Prices include VAT and P+P

Cheques made to: Commodore Business Machines (UK) Limited

Please send orders to:

      Commodore Systems

      360 Euston Road

      London NW1 3BL

* * * * * * * * * * * *

TITLES OF RECENT SUBMISSIONS TO SOFTWARE MANAGER INCLUDE:

ROOTS	CABLE SIZES
BACKGAMMON	JUMBO JET LANDER
MORTGAGE	RANDOM AND PATRIOT (WITH AUDIO)
LINE RENUMBER	SHOOT
STAR TREK	PUZZLE
BASIC COURSE FOR BEGINNERS	HP45
GOMOKU	PROFIT VOLUME WITH COST
MAGIC SQUARES	ECONOMIC ORDER QUANTITY
BEARHUNT	TIME
STARSHIP	"PETUNES" - NO PLACE LIKE HOME
MAZER	- CRADLE SONG
4K PLOT	- SINGER SONG
DIFFUSION	- SIXPENCE
CARTESIAN AXIS PLOT	- ADESTE FIDELES
MAZE	IEEE AUDIO TEST PROGRAMME
MATRIX INVERT	6522 DISPLAY
DENSE Y PLOT	OSCAR
TAPESTRY	BATTLESHIP
MINATOR	CRICKET
SIMULTANEOUS EQUATIONS	CHOOSE A NAME

Those which are suitable will be available in December.

*   *   *   *   *   *   *   *   *   *   *   *

BUSINESS

PAYROLL - £25.00   Order No. MPØ21

Designed by a practising UK accountant, this suite of programs comes in two versions (both are included). One for use with a stand alone PET can handle up to 20 employees. The other is for use with an external cassette deck and can handle up to 100 employees. The program handles NHI status, tax codes, weekly/monthly/hourly employees, 3 overtime rates and loans. The program works on a Grandfather, father and son basis. The program has an option for the user to choose to display the results on the screen or to print them out. A separate maintenance agreement (£10 annually) can be taken out with the author directly who will update users' programs when changes in government legislation occur.

ROCKSTOCK - £20.00   Order No. MPØ22

This is a stock control program designed to work on a PET system with a second external cassette deck. The use of a second cassette deck enables a virtually limitless number of items to be stored on tape. A feature of this program is that depending on the user's security level a password ensures that not all items on record will be displayed, e.g. buying price. This program is best suited when transactions are entered once daily and a daily summary of the latest position of a large number of items is then required.

ARDENSTOCK - £15.00   Order No. MPØ23

This is a stock control program designed to work on a stand alone PET. The program will handle up to 90 products recording any period of issues and receipts as well as reporting their free stock position and stock value. Re-order levels can be set and 'on order' goods also shown. This program is best suited when quicker information is needed on a relatively small number of items.

COSTING - £10.00   Order No. MPØ25

Cost report generating system covers up to 200 descriptions and costs. This can be altered by adding new records or changing existing ones. A two part coding system gives the grand total of the records and also up to 20 sub totals. The second part of the coding system allows for another 20 sub totals to be used independantly. It is easy for the user to specify the changes he wishes to make. Once the initial file set up has been performed, only one program is required to edit, add and delete records and print out the various totals available. This system is well documented and should be understood by inexperienced users.

DATA BASE UTILITY - £15.00   Order No. MPØ24

This is an aid to businessmen wanting to design their own systems and will help them create their own programs for such areas as stock control, mailing lists and personnel records. It allows the user to create, maintain and examine files of data on cassettes. Although such files contain within themselves descriptions of the file structure, the actual user data can readily be processed by the user's own application program. The file contains logical records with a common format; all data is held as strings. Second cassette deck needed.

SURVEY ANALYSIS - £8.00   Order No. MPØ27

This program will analyse the coded results of a small to medium size survey, e.g. 80 responses to a questionnaire of 12 questions.

GAMES

OTHELLO - £8.00   Order No. MPØ1Ø

Othello is a game of strategy played on a 8 x 8 board, much like a chess board. The object is to surround your enemy and convert the enemy pieces to your side. It's a game where the last moves can be quite decisive. You play against the PET brain.

PONTOON - £6.00   Order No. MPØ11

The popular card game has a true 52 card pack plus amazing graphics. You bet against the house (the PET).

WRAP TRAP - £8.00   Order No. MPØ12

Dynamic graphics game in which the player has to trap the computer. Good arcade quality graphics.

ROTATE - £5.00   Order No. MPØ14

Difficult if you are not an expert! Similar to little plastic trays with moveable letters and letter missing.

LUNAR LANDER - £8.00   Order No. MPØ15

You must make the Lunar Excursion Module land safely on the moon. By regulating the falling speed, the counterthrust of the rockets and the amount of fuel required, you should be able to accomplish this objective. If you fail, the marvellous graphics will show the Lunar Lander smashing to the surface of the moon.

TUTORIAL/EDUCATIONAL

BASIC BASIC - £9.00   Order No. MP001

A real tutorial program, introducing you to the BASIC language. Thoroughly interactive: your PET will
teach you how to operate your PET! You proceed at your own pace. You should actually be able to learn
PET's BASIC in several hours and then begin your own programming. Basic BASIC is written by two very
experienced college professors. The topics covered include line numbers, variables, strings, arrays and
the use of the various commands such as LIST, RUN and SAVE. Also basic keywords will be explained and
used such as PRINT, READ/DATA, INPUT, IF/THEN, GOTO and FOR/NEXT. Fifteen chapters, six sample programs
.... and homework assignments.

SQUIGGLE/BIG TIME   - £4.00   Order No. MP002

Squiggle draws wriggly patterns on the PET screen and illustrates programmed cursor movement, graphics
characters and use of the random function. You can adjust the randomness of Squiggle's pattern with the
number you give it when Squiggle starts. Bigtime displays the time, showing PET's timing capabilities;
and how to use the PET as the world's most expensive digital clock. An accompanying booklet describes
the programming techniques used.

SNARK   -   £12.00   Order No. MP026

This program is written by a well known Professor of Computer Science. It converts PET into a simulated
16 bit abstract machine designed for use in an elementary Computer Science course. It aims to teach the
elements of machine code programming.

PROGRAMMING AIDS

DISASSEMBLER   -   £15.00   Order No. MP003

6500 series full disassembler asks for decimal starting location and lists from this point, gives full
mnemonics and handles ASCII tables.

MACHINE CODE HANDLER   -   £3.00   Order No. MP004

This program allows you to type a list of HEX codes from a given location. These routines can then be
called using the SYS verb.

MACHINE LANGUAGE MONITOR   -   £4.00   Order No. MP005

A full HEX monitor similar to the KIM 1 operating system.

HEX EDITOR AND LOADER   -   £3.00   Order No. MP006

This allows you to edit, insert, delete, load and save HEX programs.

SCIENTIFIC/MATHEMATICAL

BASIC MATHS PACKAGE   -   £15.00   Order No. MP007

This does matrix addition, multiplication, determinants and inverses to 16 x 16 solution of simultaneous
linear equations, vector and plane geometry calculations, integration by trapezoidal, Simpson's rule or
Gaussian quadrature, differentation.   (December release)

BASIC STATISTICS PACKAGE   -   £15.00   Order No. MP008

Mean, median, variance, standard deviation, skewness, kurtosis, frequency distribution, linear regression,
T-tests, correlation analyses.   (December release)

LEAST SQUARES   -   £3.00   Order No. MP029

This program uses a well established formula for fitting a curve to any set of data points.

FINANCIAL

MORTGAGE ANALYSIS   -   £9.00   Order No. MP009

Enter the principal amount, the term and the annual interest rate and the PET will compute the periodic
payments, the total payments and the total interest for the mortgage. You enter the starting date and
the PET will display monthly, quarterly, semi-annual or annual payments. The status of the mortgage (or
loan) at any date can then be displayed, showing the interest/principal split of the previous payment, the
interest, principal and total paid thus far and still outstanding and the number of payments remaining.

BIORHYTHMS   -   £8.00   Order No. MP016

Will indicate your intellectual, emotional and physical cycles according to a well regarded series of computations based on behaviour. On an accurately drawn chart, the display will show the highs and lows of each of the three cycles.

TARGET PONG and OFF THE WALL   -   £6.00   Order No. MP017

Target Pong - insert paddles in the path of a fast moving ball to deflect the ball into a target. The secret is to use the fewest number of paddles and the least time to hit the target. Off the Wall is exactly the opposite. Here the secret is to use as many paddles as you can without hitting the targets. And to make things more difficult there are many targets in this game.

GALAXY GAMES   -   £6.00   Order No. MP018

Here are two tough but entertaining games. In both you are required to manoeuvre your space ship while firing at the enemy, and at the same time, to avoid hitting a star. In one game, you're firing at a spaceship that's piloted by an obviously drunk astronaut!

SPACE FIGHT   -   £6.00   Order No. MP019

Fire missiles at each other in this two player game. But there's a warning: each missile has limited range and if the missile doesn't hit the enemy, watch out! You could run into your own missile and lose .... and feel very silly. A game for all ages with emphasis on the younger people.

DRAW POKER   -   £6.00   Order No. MP020

Perhaps we've been minimizing the quality of the superb graphics available. With Draw Poker and Pontoon you have perfect examples of the kind of graphics we are talking about. Here you play Draw Poker against the house with two pair or better to win. The House is a tough - but fair - dealer. Of course the House is your PET.

PROGRAMME FEATURES

In this issue we are reviewing the two stock control programs available
from the Commodore Master List.

1.   ARDENSTOCK

This program has been designed for use on a standard PET (ie with 8K
bytes of memory and one built-in cassette drive). Ideally suited to the
small business user, it can handle up to 90 different product lines
simultaneously and is comprehensive enough to be used by someone with no
computer experience at all.

Once having set up your initial stock position on tape, stock transactions
are entered via the keyboard as they are executed. Instant access to
the stock position of any item is always available and at the end of
each day the new records are transfered back onto tape.

The data stored for each product line is as follows:

1.   Product number
2.   Description
3.   Physical stock
4.   Quantity on order
5.   Free stock (3 + 4)
6.   Re-order level
7.   Re-order quantity
8.   Period issues
9.   Period receipts

The last two quantities enable you to keep track on how well each
particular line is moving over a specific period. At the end of each
day, you have the option of resetting these values to zero (ie end of
the period) or retaining them so as to do a longer period check.

All in all this is a well-written program and is ideal for many PET
Users who require a simple yet comprehensive stock control system. It
is available on tape - complete with documentation - for £15.

2.   ROCKSTOCK

This is the more advanced of the two programs and requires an 8K PET plus a second cassette deck. This enables it to cope with an unlimited number of product lines - time being the only constraint.

As with Ardenstock, the operation of the program is simple, it having three main functions,

   i) creating a new master file of stock records

  ii) examining a stock file

 iii) updating a stock file

all three of which are executed by the same program.

One very professional aspect of this system is the built-in security. All stock files have filenames to distinguish them and a "password" to prevent records from being accidently altered. Three different levels of authority are provided so that, for instance, only someone with the full password can alter the selling price of a product. This makes the system ideal for use in a larger establishment where it may have many operators.

Information stored on each product includes:

1.   Buying price
2.   Selling price
3.   Quantity in stock
4.   Minimum stock level
5.   Description

and the functions are:

Look at product record

Order product

Add to, or sell from, stock

Amend product record

Create new record.

The system works by taking the "old" records from the external cassette deck and printing the "new" records onto the built-in cassette deck.

The program is a professional system and should prove ideal for many business applications. It is available on cassette - complete with documentation - for £20.

STATISTICS PROGRAMS

A range of statistics programs are now available from CYTEK UK Limited
(PET Dealers in Manchester). Titles so far include:

> T-test/U-test
>
> Paired-T/Wilcox
>
> Spearmans
>
> Polynomial Regression (Least Squares)
>
> Multiple Regression with variable deletion
>
> ANOVA-Factorial
>
> 1-Way ANOVA (Several Groups)
>
> Randomisation

For more details of these and other programs, write to:

> Cytek (UK) Limited,
>
> 17 Exchange Hall,
>
> Corn Exchange Building,
>
> Manchester M4 3EY

or ring Mr. Menhinick on 061-832 7604.

*   *   *   *   *   *   *   *   *   *   *   *

*Commodore is pleased to announce that the documentation for several of
its new programs has been increased. The instructions for the more
expensive programs now come in well laid out A4 size booklets.*

MINI-MICRO
COMPUTER GAMES
47, QUEENS ROAD,
LONDON, N11 2QP

TEL : 01-889 7615

A selection from the "PET GAMES" Catalogue (Sept. 78)

(All Games on high quality C12 Cassette Tape, to CBM PET standards)

ACEY-DUCEY (1 Player) A great Game writer described this gambling card game as
an occupational disease. Very good "real" cards display. A must
for anyone with a gambling streak. . . . . (£ 6.00)

MASTERMIND (1 Player against PET) A "Jumbo" version of this traditional Code-
Breaking game. The Code, 7 digits long, must be broken in 10
attempts maximum. (Difficult...) The smart display features
automatic positioning of your guesses, gives clues and shows PET's
screen facilities at their best. A treat. . . . . (£ 4.50)

ONE ARM PET (1 Player) A marvellous way to recoup the cost of your PET from
your friends. The most sophisticated Bandit ever. You will be
thrilled by its display and its options: Hold any window(s) ...
Shoot for Gold or Silver ... Automatic mark up or down of your
gains or losses. A definitive party winner. . . . . (£ 6.00)

CHINESE FAN-TAN (2 to 8 Players) An old oriental Casino game. Bet on a number,
if it comes up you are paid double your stake; bet between two
numbers, if either of these numbers comes up you are paid even
money. The large number of players this program can accommodate(8)
makes it the ideal choice for a party. It is totally addictive . . (£ 6.00)

A MAZE (1 Player) Creates a different maze at each run; you have 75 moves to
extricate yourself from it. Very ingenious dynamic graphics. Quick
game, good for instant relaxation. . . . . (£ 2.00)

THE RULER (1 Player) Management game. You are in charge of a whole town, its
populace and resources for a term of 7 years. It is up to you to
make the city prosper, but don't think it will be all roses: natural
disasters; strikes; political unrest and unemployment problems could
be facing you at any time. Make one wrong decision and your economy
could be threatened. Too many mistakes and you will be impeached.
For would be Prime Ministers and economists. . . . . (£ 4.50)

****
AND MANY MORE
****

Buy it with Access

Phone or write N O W for our complete Catalogue.

MAIL ORDER ONLY. All cheques, P.O. etc., made payable to MINI MICRO.

Peripherals & Attachments

MINI-FLOPPY DISC REVIEW

The cassette file handling system built into the PET is both efficient and
easy to use. It is not, however, a fast system and there are some
applications - particularly business ones - where a faster system would
be invaluable. A floppy disc provides high speed access to a vast
amount of data (or programs) and Commodore are developing a PET mini-
floppy disc system to sell at a very competitive price early next year.

Meanwhile, however, a new company, called Midland Micronics (associated
with Taylor-Wilson Systems Limited), have just developed a mini-floppy
disc system especially for the PET - called the MM3. In line with our
policy of keeping PET Users up to date with the latest developments, we
have decided to review this new peripheral at its launch.

THE MIDLAND MICRONICS MM3 MINI-FLOPPY DISC SYSTEM

The first thing that strikes you about the MM3 is the excellent external
design. The twin floppy unit sits as a saddle over the PET's VDU with
one drive mounted vertically at each side. The steel casing is styled
and painted to match the PET and once set up, the whole system looks
like one integrated unit - in keeping with the original PET concept.

Inside, the controller is operated by an Intel 8048 microprocessor and
sports a set of commands to perform all the necessary functions in
transferring data between the PET and the disc drives.

On the prototype I saw, the controller (written in machine code) was fed
in from a cassette tape after switching on. The production model,
however, will have this on an additional ROM inside the PET and hence
will not occupy any RAM space at all. The new ROM will "piggy back"
onto one of the PET's ROMs and apart from the main connector (which goes
through the memory expansion port) is the only connection to the PET;
the floppies have a separate mains power supply.

Although there are a few details to finish before the first model rolls off the line, the research and development is moving at a commendable rate.   In between viewing the system on Saturday 21st October and Monday 23rd October it had increased in specification considerably! Some parts of production have already begun and Midland Micronics say they will commence delivery on 20th November.

Turning to the operation of the system, this is no more difficult than the PET cassette system and functions equivalent to SAVE, LOAD, OPEN, CLOSE, PRINT, INPUT, GET, etc, are directly available.

Each disc can output up to 80K bytes of useful data - in addition to the space taken up for its own operation.   The 5¼" magnetic discs themselves can be flipped over to give a total of 160K bytes of useful data each. The time to seek out a particular data file or program on the disc is estimated at an average of 370 micro-seconds (which is somewhat faster than the cassette!!!).   Once having located a file, data is transfered to the PET at least 40 times faster than the cassette - a demonstration of 'WRAP TRAP' and other games being loaded in under 2 seconds is quite convincing.

Actual disc-operation functions are executed in a BASIC program with the USR instruction.   These include:

FORMAT   to format the disc into 40 tracks by 16 sectors prior to use.

CATALOGUE to search through a complete disc and list the names of all
          the files on that disc. (This takes just a few seconds.)

DRIVE   to specify which of the two disc drives you are referring to.

In conclusion, this system has been designed with PET Users in mind. It is both simple to operate and very fast, making it ideal for many business applications such as stock control and accounting. For those users who cannot afford to wait for Commodore's own disc system, the MM3 will provide them with an immediate solution.

For further details of the system, write to:

Mr. Peter New
Midland Micronics
Oakfield House
Station Road
Dorridge
Solihull   Tel: 05645 6192

Price of the MM3 twin drive is £1,300 + VAT
Single drive stand alone disc: £870 + VAT

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HIGH QUALITY PRINTING

We get frequent requests for information on how to link the PET to a
high quality golfball printer, such as an IBM typewriter. This would
make possible business letters and invoicing in a presentable form, and
in view of the number of word processing programs appearing, the advent
of a PET word processing system is not too far away. We were thus
pleased to hear that one of our PET dealers - G R Electronics Limited -
is now selling a PET compatible golfball printer.

Based on the reliable IBM 3982 'Golfball' unit, it gives full ASCII
printer facilities, with the ability to change typefaces and founts to
suit different applications. It will copy letters, invoices, program
listings, etc, in capitals and lower case, either as set up on the PET's
screen or retrieved from its memory. Printing speed is 15 characters/second
with a line width of 130 characters. The pitch is 10 characters/inch,
though it may be modified to 12 pitch if required.

The printer is driven via the 8-bit user port and is controlled by a
machine code program which is supplied on cassette and takes up only
$\frac{1}{4}$K byte of memory. This method of operation gives the User complete
flexibility in code conversion and timing as well as 'carriage return',
'line feed', 'tab' and 'backspace' functions. It includes routines
for listing PEEK/POKE characters, solenoid codes and characters actually
printed.

The printers themselves are second-user, heavy-duty units, regularly maintained during their initial service lives as satelite printers in a large distributed system. They have been reconditioned by an IBM specialist, from whom service and repair facilities are available.

Price for the printer complete with interface and software cassette is £475.

For further details contact:

> G R Electronics Limited
> Fairoak House
> Church Road
> Newport
> Gwent
> NPT 7EJ

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IJJ MEMORY EXPANSION BOARDS

Since the last issue, we have seen and tried one of the IJJ Designs Limited memory expansion boards. We understand that demand for the boards is heavy, but IJJ say they hope to meet new orders from stock by the end of November. A machine code program to test all memory locations will be available soon at a price of £5. For more details ring John Irwin on Marlborough 52818 after 7.00 pm.

SMALL SYSTEMS ENGINEERING LTD

62 New Cavendish Street,
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TERMS

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Applications

There are almost as many applications for a PET as there are PET's themselves. We would like to find out what the PET is being used for so that we can pass on relevent delails to other people interested in the same area of use.

We are thus offering £25 worth of free Master Library software to the best 'Applications' article published in each issue. If you would like to write about what you are doing with your PET please include the following details:

1.   What the nature of the application is.
2.   What (if applicable) non-computerised system has the PET replaced.
3.   Details of any extra hardware used.
4.   Any "special features" of the programs used.
5.   Who else this system might be useful to.
6.   Any further improvements/modifications intended.

The application featured this time is perhaps an unusual one - it concerns school meals. Many PETs have already been sold to Secondary Schools and an application to the administration side of a school increases even more the potential of PET as a schools computer. The article indicates that the PET has not only been useful to operate the system, but has provided another invaluable function - encouraging someone to learn and practise BASIC programming.

MONITORING COST AND NUTRITION IN SCHOOL MEALS

"As a Cook Supervisor of a girls secondary school in Cheshire, my
responsibilities include meeting cost targets and nutritional standards
set by the School Meals Service. In particular I have to produce meals
with ingredients costing out as closely as possible to a set figure and
at the same time having a protein content in excess of a set minimum.

These two statistics are currently computed by a central staff at
Chester. I get the results 7-8 weeks after the meal has been prepared
and eaten. To be informed at this stage that my costs are too high, or
protein too low, is rather like telling off a child two months after the
'event'!

My husband has taught me the rudiments of BASIC. He is now neck deep in
machine code, driving himself, and me, mad. (I do find it just a little
disconcerting to hear him shout out in bed "Shift Left", "Rotate", "Load
Immediate", only to find he's talking in his sleep!!) So I decided to
write a School Meals Statistics Program on my own.

The initial requirements were to produce, each week,

1.   the average ingredient cost of a school meal, broken down into four
     categories according to food type, and
2.   the average protein content of a school meal.

The data available was:

1.   My own stock sheets which show daily and weekly quantities used for
     each of approximately 150 ingredients; their cost per unit quantity
     and which food category they belong to.

2.   Protein content data for each ingredient. This was kindly supplied
     by the Chester office, who showed some interest in my project.

The first task was to create the main file on tape. Our PET being just the basic configuration, the whole file has to be read into store before processing. The data for each ingredient is packed to save string space. The record for each item takes the form ingredient name/category/protein content/ (where "/" is an item separator). A sequence number, cross-referencing to the stock sheets, is generated for each ingredient by the main program so is not required on the file. A glance at the old stock sheets and some experimentation showed that cost update runs would be required every week if costs were held on file, requiring an extra six minutes of data entry, processing and tape writing time. On the other hand entering costs as data on each weekly run takes less than three minutes.

Creating the file was the biggest chore. I arranged the program so that I could type from the stock sheets, with an assistant calling out protein values for each item as we came to it.

The calculations involved in the weekly run program are negligable – just a matter of accumulating totals and finding averages. The main programming effort was in formatting the input and output.

After reading the entire file, a set of headings appears on the screen

     NO.   ITEM   AMOUNT   COST

then for each item the sequence number and ingredient description appear, while the cursor tabs to AMOUNT. Zero or Null 'Return' wipes out that item replacing it with the next. 'E' causes the program to go on to the next stage. Otherwise, the cursor tabs to COST. When this is entered, the total for the relevant Category is updated by AMOUNT times COST and the protein total by AMOUNT times PROTEIN.

Originally there was no provision for error correction. Once the totals were updated, the data was lost. However, there was sufficient space left to amend the program to record the AMOUNT/COST for each item, packed onto the end of the existing data in store. Two additional routines now allow for error correction. 'R' followed by the sequence (or line) number of the suspect item gets the totals 'Deupdated' and the item details displayed again for new data entry before resuming normal sequence. The other lists Line Number, Ingredient, Amount and Cost for all items processed so far, twenty per page in groups of five.

Once all ingredient data is in, the program asks for the total number of meals. When this is entered, the results are calculated - division, rounding and right align - and displayed as a table. I copy this onto the bottom of my stock sheets for a permanent record. There are only six figures, so it is no chore.

The time for a run is approximately 12 minutes for data entry and under one minute for tape reading. If I had access to the PET in the school kitchen, I could obtain daily figures before the meal was served.

There are no special tricks in the program. I used my husband's home-brewed Renumber and Append programs to latch on several of his standard subroutines, such as "Data Entry", "File Write" and "Round and Align Right" which, frankly, have coding I do not understand, although I know what goes in and what comes out the other end.

Planning took possibly 3-4 hours over a two week period, the programming took me about five hours over one weekend and, with help from my husband, was debugged in another half hour. He had a bit of a giggle at some of my coding but his attitude has been - "If it works, leave it alone". I feel quite a sense of accomplishment and got a great deal of pleasure from writing the program plus a moment of ecstasy when the results of the first run tallied exactly with our laborious hand calculations.

Perhaps more importantly, my confidence in programming in BASIC has increased considerably. I feel ready to tackle something more complex. To this end I am now working on a Menu Planning Program which takes into account not only the criteria set by the School Meals Service but also what my girls like to eat!!"

JANET GROSS NIKLAUS
25 Longdown Road, Congleton, Cheshire

Programming

HIGH SPEED FILE ACCESS

There are many PET applications which require the reading
and writing of several data files in one program. Since it
is often inconvenient (or too expensive) to keep each file
on a separate tape, it is normal practice to record several
jobs on one tape - distinguished by their filenames. However,
this can mean a long wait while searching for a file towards
the end of the tape and many users have been looking for a
way to decrease this search time.

This article describes one very good method, by using a
short subroutine to control the cassette drive in 'FAST
FORWARD' mode prior to writing or reading a file. By keeping
note of the Fast Forward times, any particular file can be
located at a much higher speed and with a reasonable degree
of accuracy. To make use of this facility, proceed as
follows:

1.   Enter the following subroutine (suitably re-numbered if
     necessary) into your program:

```
1000      ?"♥ Rewind the cassette and then lift up the
          cassette lid"
1010      ?:?"Press   F.FWD   and then    RETURN":GOSUB 1200
1020      ?:?"Wait for a moment"
1030      OPEN 1,1,1
1040      ?"Now push the cassette back into the deck
          and press   RETURN"
1050      GOSUB 1200
1060      ?"♥Fast forwarding for "T" seconds"
1070      Z = TI:POKE59411,53
1080      If TI<Z+60*T-340THEN1080
1090      POKE 59411,60:Close 1
1100      ?"♥Now in position"
1110      ?"Press  Stop  on Cassette#1 then   RETURN"
1200      Get A$:IfA$=""Then 1200
1210      RETURN
```

2. To Fast Forward for 'n' seconds, set T=n and GOSUB to
    the above subroutine. Try this a few times and you will
    soon get the idea.

3. The basic idea when handling a number of files is to
    record them in known places. Before 'OPENing' to write
    a file, one might use the subroutine to Fast Forward
    for eight seconds. Thus to access that particular file
    later, simply Fast Forward (again using the subroutine
    for eight seconds) before 'OPENing' to read.

    A typical program using this idea might look something
    like this:

```
        .
        .
        .

100     T=10:GOSUB1000          F.FWD for 10 seconds
110     POKE 243,122:POKE 244,2 see Issues No. 1 & 2
120     OPEN 1,1,1,"FILE 1"
        .                       Write data for
        .                       file 1
        .
190     CLOSE 1
        .
        .
        .

350     T=15:GOSUB1000
360     POKE 243,122:POKE 244,2
370     OPEN 1,1,1,"FILE 2"
        .
        .                       Write data for
        .                       file 2
410     CLOSE 1
        .                       Having written files,
        .                       they can be read back
        .                       as follows:
```

```
53Ø        T=1Ø:GOSUB1ØØØ                          F.FWD to file 1
54Ø        OPEN 1,1,Ø,"FILE 2"

           .
                                                   Read back file 2
           .

           .

58Ø        CLOSE 1

           .

           .

           .

71Ø        T=15:GOSUB1ØØØ
72Ø        OPEN 1,1,Ø,"FILE 2"

           .
                                                   Read back file 2
           .

           .

83Ø        CLOSE 1

           .

           .

           .
```

This system - if used correctly - can save you a lot of
time in searching for files and hence has many applications
in business and other programs.

The following points should be noted:

a) The Fast Forward on a cassette deck is not linear -
    the tape travels faster as more is wound on the
    accepting spool. This means that for recording
    files of the same length, the larger values of T
    can be closer together than the low ones.

b) Different types of tape and different PETs Fast
    Forward at slightly different speeds. We therefore
    recommend that for a particular program, you stick
    to one type of tape and one PET.

c) Trial and error is the only real way of discovering
    just how close together you can pack your values
    of T.

d)   Do not try to Fast Forward for T less than six
     seconds.

e)   After Fast Forwarding, the PET will still allow a
     gap of several seconds (at playing speed) before
     starting to write a file. This is, in fact,
     useful as it allows a safety margin when re-
     accessing the file.

f)   The system described in this article could be
     extended to form an almost automatic filing
     system, where each tape had a 'catalogue' at the
     start giving the filenames and Fast Forward times
     to all the files on that tape. An improved
     subroutine would look up this value and hence find
     any file by name - very quickly. We would very
     much like to hear from any User who takes up this
     idea.

g)   The subroutine at the moment takes up 425 bytes of
     storage. After some practice, however, much of
     the prompting and wording can be removed or
     abbreviated.

"EXTRA USE OF THE VERIFY COMMAND

VERIFY has the useful property of reading a program without
loading it. Even if an error is detected, it is not displayed
until the whole program has been read.

This provides a quick means of finding the end of a program
on a cassette without losing what you currently have in the
memory.

For example, one is occasionally in the position of having
loaded a program, rewound the tape, modified the program and
now wish to save the new version after the old. Using an
extra tape, this can be done using LOAD and SAVE, with a bit
of shuffling.

Quicker however is to use the VERIFY command. When the
error message appears, you know you are at the end of the
old program. Select STOP on the cassette and SAVE in the
normal way. (Remember to use a program name with a different
initial character from the old one!)"

Mike Nicklaus
25 Longdown Road, Congleton

IEEE BUS HANDSHAKE ROUTINE IN MACHINE LANGUAGE

To use the IEEE-488 bus on the PET at maximum speed it is necessary
to use machine language rather than BASIC 'INPUT' and 'PRINT'. The
routine given here has been used with an HP3437A systems voltmeter to
reach data transfer speeds of over 5000 bytes per second, corresponding
to 2500 voltage readings in 2-byte packed binary format or 625 readings
in 8-byte ASCII format. The best speed attained in BASIC is 75 readings
per second transferred as character strings.

The IEEE bus

Details of the IEEE-488 bus are given in the PET Users Handbook, but some
clarification of the register addresses on page 120 of the handbook is
helpful. These are:

HEX	DECIMAL	BITS	IEEE	DIRECTION
E820	59424	0-7	DIO 1-8	from bus
E822	59426	0-7	DIO 1-8	to bus; 'PET'controlled
E821	59425	3	NDAC	'PET' controlled
E823	59427	3	DAV	'PET' controlled
E840	59456	0	NDAC	from bus
		1	NRFD	'PET' controlled
		2	ATN	'PET' controlled
		6	NRFD	from bus
		7	DAV	from bus

Note that on the IEEE bus, 'high' is logic false and 'low' is logic true;
and that the data bus must be left with all bits 'high' when PET has
finished to avoid confusion of data put on to the bus by other devices.

The program

The program controls a given number of data transfers, each of 8 bytes, from the HP3437A to the PET. Each one is preceded by a trigger (GET - group execute trigger) on the IEEE bus, and the HP3437A must be correctly addressed as a 'talker' or a 'listener' at all times by sending MTA (my talk address) or MLA (my listen address) before transfers as appropriate. The sending of messages (GET, MTA, MLA, etc.) or data is controlled by the ATN line; ATN is true when messages are being sent.

The program and returned data are held in the top 2K of memory; this is hidden from BASIC using POKE 134,255 : POKE 135,23 as the first line of the BASIC control program. The number of readings required is POKEd into 6400_{10}, then control passed to the machine language program by SYS(6144). The data bytes coming in on the IEEE bus are stored in locations 6401_{10} onwards; these are PEEKed out on return to BASIC, and converted into numbers using the function VAL. As the index register is used for counting, only 256 bytes can be transferred using this program, but it would be easy to modify the program to perform more transfers.

Disassembled listings with comments and a separate listing (for ease of copying into BASIC DATA statements!) are given.

This program was prepared using a machine language handler written by the author, and the listings produced by this handler and by a modified version of the 'disassemble' part of the PETSOFT©ASSEMBLER 'EXEC' program.

IEEE bus handshake routine - main program

```
1800  A200      LDX #00        prepare index register
1802  A9FB      LDA #FB        set ATN low
1804  2D40E8    AND E840
1807  8D40E8    STA E840
180A  A928      LDA #28        MLA (28 for this device)
180C  8501      STA 01
180E  208018    JSR 1880       handshake into bus
1811  A908      LDA #08        GET
1813  8501      STA 01
1815  208018    JSR 1880       handshake
1818  A948      LDA #48        MTA
181A  8501      STA 01
181C  208018    JSR 1880       handshake
181F  A9FD      LDA #FD        set NRFD low (ready to receive data)
1821  2D40E8    AND E840
1824  8D40E8    STA E840
1827  A9F7      LDA #F7        and NDAC low also
1829  2D21E8    AND E821
182C  8D21E8    STA E821
182F  A904      LDA #04        set ATN high
1831  0D40E8    ORA E840
```

```
1834  8D40E8  STA E840
1837  A008    LDY #08      ready to count 8 bytes
1839  20B018  JSR 18B0     handshake data from bus
183C  A502    LDA 02       result to A
183E  9D0119  STA 1901,X   store in  1901+X
1841  E8      INX
1842  88      DEY
1843  D0F4    BNE 1839     jump if Y not zero
1845  A9FB    LDA #FB      set ATN low
1847  2D40E8  AND E840
184A  8D40E8  STA E840
184D  A902    LDA #02      set NRFD high
184F  0D40E8  ORA E840
1852  8D40E8  STA E840
1855  A908    LDA #08      set NDAC high
1857  0D21E8  ORA E821
185A  8D21E8  STA E821
185D  A95F    LDA #5F      UNT
185F  8501    STA 01
1861  208018  JSR 1880     handshake to bus
1864  A904    LDA #04      set ATN high
1866  0D40E8  ORA E840
1869  8D40E8  STA E840
186C  CE0019  DEC 1900     decrease counter
186F  D091    BNE 1802     jump if not zero
1871  60      RTS          return to BASIC program
```

subroutine to handle handshake into bus

```
1880  AD40E8  LDA E840     NRFD ?
1883  2940    AND #40
1885  F0F9    BEQ 1880     jump back if not ready
1887  A501    LDA 01       ready:  get data byte
1889  49FF    EOR #FF      complement it
188B  8D22E8  STA E822     send to bus
188E  A9F7    LDA #F7      set DAV low
1890  2D23E8  AND E823
1893  8D23E8  STA E823
1896  AD40E8  LDA E840     NDAC ?
1899  2901    AND #01
189B  F0F9    BEQ 1896     jump back if not accepted
189D  A908    LDA #08      accepted;  set DAV high
189F  0D23E8  ORA E823
18A2  8D23E8  STA E823
18A5  A9FF    LDA #FF      $255_{10}$ into bus
18A7  8D22E8  STA E822
18AA  60      RTS          return to main
```

subroutine to handle handshake from bus

```
18B0  A902    LDA #02      set NRFD high
18B2  0D40E8  ORA E840
1885  8D40E8  STA E840
18B8  AD40E8  LDA E840     DAV ?
18BB  2980    AND #80
18BD  D0F9    BNE 18B8     jump back if not valid
18BF  AD20E8  LDA E820     get data byte from bus
18C2  49FF    EOR #FF      complement
18C4  8502    STA 02       store in $ 0002
```

```
18C6 A9FD    LDA #FD      set NRFD low
18C8 2D40E8  AND E840
18CB 8D40E8  STA E840
18CE A908    LDA #08      set NDAC high
18D0 0D21E8  ORA E821
18D3 8D21E8  STA E821
18D6 AD40E8  LDA E840     DAV high ?
18D9 2980    AND #80
18DB F0F9    BEQ 18D6     jump back if not
18DD A9F7    LDA #F7    . set NDAC low
18DF 2D21E8  AND E821
18E2 8D21E8  STA E821
18E5 A9FF    LDA #FF      255₁₀ into bus
18E7 8D22E8  STA E822
18EA 60      RTS          return to main
```

IEEE bus handshake routine listing

```
1800 A2 00 A9 FB 2D 40 E8 8D
1808 40 E8 A9 28 85 01 20 80
1810 18 A9 08 85 01 20 80 18
1818 A9 48 85 01 20 80 18 A9
1820 FD 2D 40 E8 8D 40 E8 A9
1828 F7 2D 21 E8 8D 21 E8 A9
1830 04 0D 40 E8 8D 40 E8 A0
1838 08 20 B0 18 A5 02 9D 01
1840 19 E8 88 D0 F4 A9 FB 2D
1848 40 E8 8D 40 E8 A9 02 0D
1850 40 E8 8D 40 E8 A9 08 0D
1858 21 E8 8D 21 E8 A9 5F 85
1860 01 20 80 18 A9 04 0D 40
1868 E8 8D 40 E8 CE 00 19 D0
1870 91 60 EA EA EA EA EA EA
1878 EA EA EA EA EA EA EA EA
1880 AD 40 E8 29 40 F0 F9 A5
1888 01 49 FF 8D 22 E8 A9 F7
1890 2D 23 E8 8D 23 E8 AD 40
1898 E8 29 01 F0 F9 A9 08 0D
18A0 23 E8 8D 23 E8 A9 FF 8D
18A8 22 E8 60 EA EA EA EA EA
18B0 A9 02 0D 40 E8 8D 40 E8
18B8 AD 40 E8 29 80 D0 F9 AD
18C0 20 E8 49 FF 85 02 A9 FD
18C8 2D 40 E8 8D 40 E8 A9 08
18D0 0D 21 E8 8D 21 E8 AD 40
18D8 E8 29 80 F0 F9 A9 F7 2D
18E0 21 E8 8D 21 E8 A9 FF 8D
18E8 22 E8 60
```

0001 data to go into bus
0002 data from bus

1900 counter for number of data transfers

1901 start of results area

John A. Cooke

Department of Astronomy
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Royal Observatory
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Users' Directory & Announcements

One of the major advantages in being a member of the PET Users' Club is the ability to get hold of PET related software and ideas. Although the Common Library of programs is now flourishing, we get frequent requests for names of people who have written software for a specific application.

We are therefore publishing, in each issue, a current Users' Directory, containing lists of people writing software, importing literature or starting local PET Groups. If you would like to use your PET for fun and profit, why not offer personal tutoring in PET programming to new PET owners. Alternatively, if you require a program to be written for you, ask for contacts via the Users' Directory. The possibilities are endless. To print more official company advertisements, please write to the Editor, PET Users' Club, at the address below.

To include your name in the Users' Directory, please complete the following form:

To: The Editor, PET Users' Club, **Commodore** Systems,
     360 Euston Road, London NW1 3BL

NAME   ....

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contact them - not Commodore. Entries are published on a first-come-
first-served cyclical basis.*

LETTERS SECTION

Letters should be addressed to:

The Editor

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SIMULATING AN HP-25 ON THE PET

From Mr. J. Clark, 5 Parkview House, 9a Eastbury Road, Watford, WD1 4PZ

"Following a remark in Newsletter No. 3, I have been experimenting with simulating a programmable calculator on my PET. I've been simulating an actual model (up to a point, anyway) - in my case a Hewlett-Packard HP-25. This machine is quite a versatile calculator, featuring Reverse Polish logic, a good, but not enormous, range of pre-programmed functions, and a reasonable amount of program capacity including some merging of key-strokes. Some addressable memories are available, with memory arithmetic.

I have written a BASIC program to simulate this on a PET, and it seems to run OK, certainly as far as all the major features are concerned. I have decided not to include two features of the HP-25 at present: I've ignored 'Error' messages and just let PET's BASIC do its own thing when improper operations or overflows occur; and I haven't modelled the HP's capacity to change the format of output numbers either manually or under program control.

I've written a working program, but I haven't had much time available so far to polish it up, so it's probably still rather clumsy. I think the only bugs left (if any) will be wrong responses if you enter idiotic sequences of key-strokes. It's been quite an interesting

exercise, but the end result (in BASIC anyway) seems likely to be of little value. As a simulation of a live calculator, it's fine, but when running a stored program, it's painfully slow at present. Maybe further development work could speed things up a bit, of course. It's quite a longish program too; with a small program of about 15 steps stored and run the FREstore message is just over 2000.

I hope these notes on progress so far may be of some interest."

Ed: Thanks for taking up our suggestion and reporting on progress thus far. If you can speed up the program with some machine code routines, we would very much like to publish it.

*   *   *   *   *   *   *   *   *   *   *   *

STAR TREK

From Mr. Frank Bell, 26 Worcester Road, Uxbridge, Middx, UB8 3TH

"I would be most grateful for your help. My hobby is the development of computer games, and it is my aim to produce a definitive version of Star Trek using PET's unique capabilities. I have several versions, all massively long, and these when pruned to fit are without character or interest. I would very much appreciate if you will appeal to Club Members on my behalf, asking for program listings or source references of short (ie less than 8K) versions of Star Trek. I will, of course, return any material that is loaned to me in this way, and if any substantial help is forthcoming, will gladly send a copy of the resultant program to the person concerned.

In closing, I must congratulate you on the very considerable improvement in the Newsletter. I have the feeling that on the progress made so far, the future issues will prove to be a valuable asset to PET owners."

*   *   *   *   *   *   *   *   *   *   *   *

TWO USES OF PET IN A LABORATORY

From Michael J. Smyth, University of Edinburgh, Department of Astronomy, Royal Observatory, Edinburgh, EH9 3HJ

"Graph Plotting

PET can function as a simple graph plotter, using a laboratory chart recorder. The function to be plotted is scaled to the range 0 - 255 and the resulting value POKEd into the User Port. An inexpensive ZN425E digital-to-analogue converter (R.S. Components Limited) converts the 8 bits into a voltage, which is plotted. Delay loops are inserted to prevent the output from varying too fast for the recorder to follow.

Control of Stepping Motor

PET can generate TTL pulses to control a stepping motor (eg a spectrometer drive) by POKEing successive 1s and 0s into the User Port. The use of BASIC limits the speed to about 50 irregular pulses per second. Machine language allows pulse rates of many thousands per second (if necessary!) but the pulse trains are split up by hardware interrupts every 1/60th second, when PET updates its clock and scans the keyboard. SEI (set interrupt disable) at the beginning of the subroutine suppresses these interrupts; CLI (clear interrupt disable) at the end restores normal functions."

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APOLOGIES to Mark Taylor for missing out a program line from his letter printed last issue. His third paragraph should read:

3.   I have found an error in the Disassembler programme. Line 2710 should read

        2710   IF I <> 108 THEN 2610

not 102 as at present.

*   *   *   *   *   *   *   *   *   *   *   *